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## Elementary Lessons

### HYGIENE.



THE ACTION AND USES OF

# ALCOHOL

IN THE HUMAN BODY.

FOR USE IN SCHOOLS AND FAMILIES.

BY R. O. BEARD, M. D.

1882.

CHICAGO.

BEARD BROTHERS,  
PUBLISHERS AND BOOKSELLERS.



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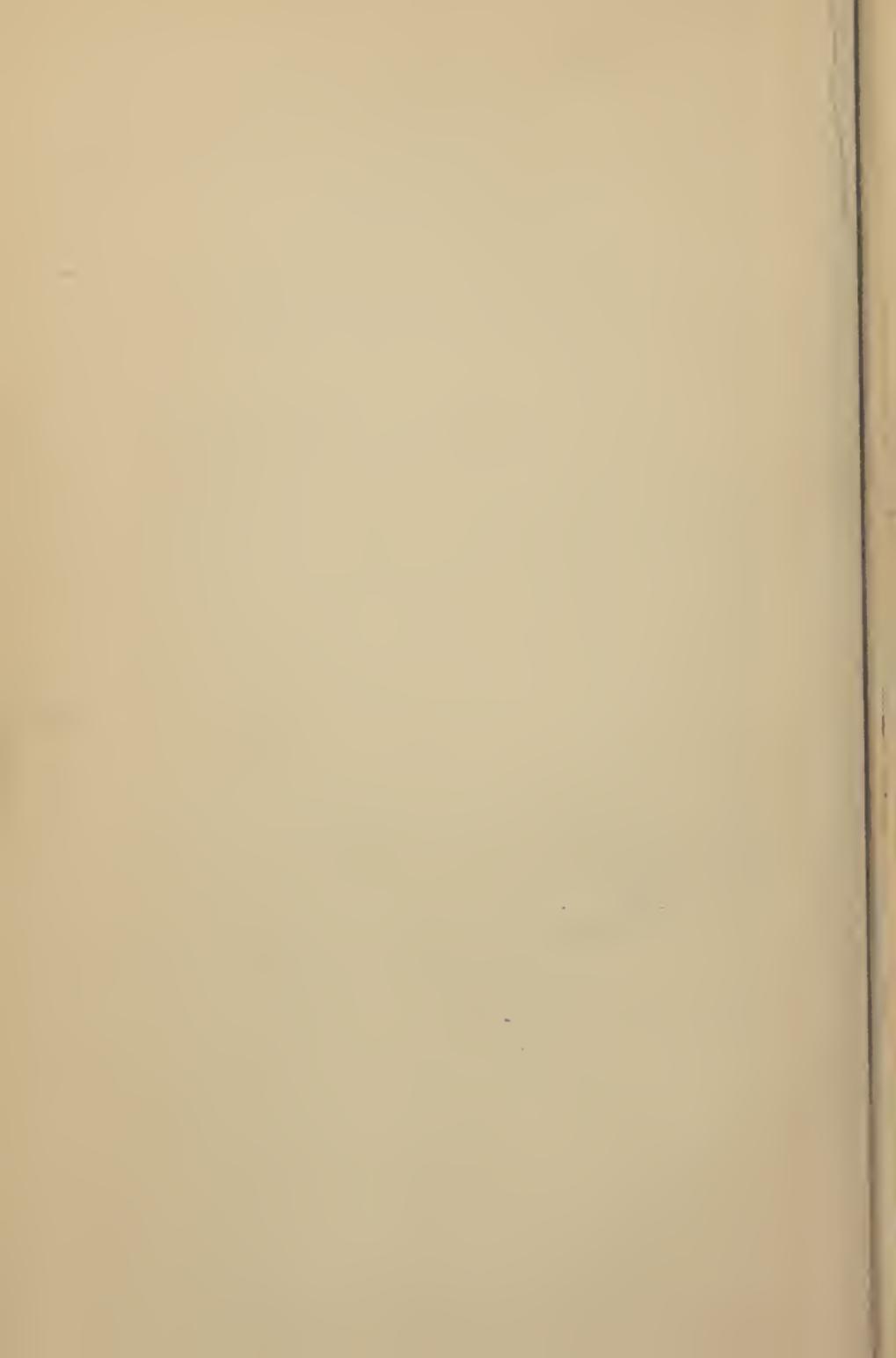
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U. S. GOVERNMENT PRINTING OFFICE: 1928





Elementary Lessons in Hygiene.

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## P R E F A C E .

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To TEACHERS AND PARENTS :

The importance of an elementary study, in both school and home, of the laws of physiology and hygiene, is receiving the active recognition of educators, and those interested in the education of youth.

In no direction is the need for a study of this subject so apparent as in its application to the action and uses of alcohol in the human body, for the simple reason that no more active cause of disease and misery exists, than in the violation of health-laws by the use and abuse of this agent. Upon the scientific understanding, given to the rising generation, of this—the prime cause of our physical degeneracy and social disorder—rests our only sound hope of relief from the curse of intemperance.

In placing before the public this series of *Elementary Lessons*, based upon the experimental conclusions of leading scientists, supplemented by personal research, the author has aimed to supply the demand for a work

of scientific accuracy and sufficient simplicity to meet the needs of practical school-teaching.

He desires to urge upon those who superintend its use, a careful personal study of the subject, to be derived, not alone from this small volume, but also from text-books of a more advanced order. The preparation of such a work, to supplement these lessons, is contemplated, and, in the meantime, he would recommend the employment of Dr. B. W. Richardson's manual, as a teacher's aid.

It is intended that the present Elementary Series shall be placed in the hands of pupils, that they shall be required to make a special study of each topic, elaborated by the teacher's own effort, and enlivened by illustrations or object forms which his or her own ingenuity may readily devise, and followed by a careful use of the questions, appended to each lesson in review.

By this means a permanent impression will be made upon the mind of the scholar, and principles will be instilled which may prove, in many an instance, of life-long service.

*Minneapolis, Sept. 1, 1882.*

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## LESSON NO. I.

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### **INTRODUCTORY.**

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ALL our life long each one of us has to ask, or to have asked for us, the question: *How to be well?* To be well usually means to be *happy*, and to be sick, *unhappy*. How to secure health is, then, a question that we all have to answer. And in trying to answer it we find that there are certain things that are necessary for us in order to enjoy health. These necessaries are very few. Many things that we think we need, are not only unnecessary to our health and happiness, but really harmful to both. In order that we may find out whether a thing is *good* for us or *harmful* to us, we must see what there is that we actually need.

These needs are only *six* in number. They are:

1. Fresh air.
2. Suitable clothing.
3. Sleep.
4. Exercise.
5. Good food.
6. Pure water.

*Having* these, we may be well : and *without* these we shall be more or less sick, and may die.

It is the object of these lessons to learn whether one particular thing, which is called "alcohol," and which some people drink,—*is*, or *is not*, necessary to the health of our bodies; and to do this we must try to learn how alcohol acts when it is *taken* into the body, and see whether it gives to us either of these things that we need.

We know at once that alcohol cannot take the place of fresh air, sleep, exercise or clothing; that it can only be of use to us, if it is at all, as food and drink; and so we shall, first of all, try to find out what good food and drink are.

## LESSON NO. II.

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### NATURAL FOOD.

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You know that in order to live we must eat,—and the first question which naturally comes to us is: “What shall we eat?” We must remember that in this respect we are just like any other animal,—that is, we know in the same way as the horse, or the cat, or the dog knows, what is good for us to eat, and we call this knowledge, *instinct*.

It is not taught to us; it is knowledge that we possess when we are born, and is common to men everywhere, no matter whether they have been taught anything or not; it is part of our nature. God has given us a natural taste for what is good for us to eat, and He has also provided food that is best suited to our wants, and we call this “Natural Food.”

Let us remember these two facts: 1st—that

we have a Natural Taste for that which is proper for us to eat and drink; and 2d—that Natural Food is given to us to satisfy this taste.

The *most* natural food which Nature supplies is that upon which we all feed during the first years of our life—namely, *milk*. In milk we find both food and drink. The solid parts are the real food, and form one-eighth of the milk—the other seven-eighths are *water*. Later in life, we find the fruits and vegetables of the earth, in their many forms, suitable for foods. There are some people who live entirely upon these; others add to them various kinds of animal flesh, which we are accustomed to call *meat*.

These foods are all of them Nature's provision for our wants, and we may notice one very important thing which is true of all of them—they are best fitted to form our food only when they are in their fresh natural condition. When milk has soured, when fruits or vegetables are over-ripe, when meat has begun to decay, we say they are no longer

fit for use ; they are “bad” ; more correctly speaking, they have passed through a chemical change which has to some extent altered their nature ; they are apt to cause sickness if we eat them after they have passed into this condition. Our own natural taste tells us that they have become unfit for our use. This natural taste, guided by the experience of those who have learned more than we, is the means of protecting us from the use of a great many things which are poisonous in their nature, and which would destroy life or injure health. There is an old saying that “what is one man’s food is another man’s poison,” but like many other old sayings, it is quite untrue. In the main, what is food for one man is food for *every* man, and what is poison to any of us is poison to all. I think we may take it to be a good rule that to the natural taste of a child every *poison is unpleasant*.

QUESTIONS ON LESSON No. II.

1. What do we mean by Natural Food?
2. How does a child or an animal know what is fit to eat and what unfit?
3. What is the *most* natural food we have?
4. What other things do we call natural food?
5. Are these things fit for our use as food in whatever condition they are in?

## LESSON NO. III.

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FOOD AND POISON.

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IN our last lesson we learned something about *natural food*, — that is, food which Nature has provided for our use. It may occur to some of you, at once, that there are other things than those we have mentioned which form a part of our daily food.

This is true, and we call these things *artificial foods*, meaning that they are made by man from certain natural materials, and are used by us in a changed form. Bread, cheese and butter belong to this class of foods, and, as you know, are very nourishing and useful. Men learned long ago how to make these articles, and have found by taste and experience that they are fit to eat and are not in any way harmful to us. In our choice of these we are guided in the same way as in our selection of natural foods,—first, by our

natural taste, and second, by the experience of others. To a *natural* taste *every* poison tastes badly at first, but if we *persist* in taking even what we dislike, we may after a time *learn* to like it; that is, we may form a false taste for something that is hurtful, and this false taste becomes a constant *craving* or *desire*, which is very hard to resist.

We must not, however, rely upon this rule alone; sometimes our own taste is not natural or pure; we often find children who are born with a taste for certain things that are harmful and even dangerous.

Many a poor creature has been led in this way to drink wine or spirits, and has become at last a wretched drunkard through the constant use of them. It is, therefore, necessary for us to learn from the experience of others who have tried the use of many articles of food and drink, and have closely studied their effects upon both mind and body.

It is better still for us all to inquire into and study such questions for ourselves, and to understand clearly the nature and effects

of the things we eat and drink. We should save ourselves and others a large part of the sickness from which we suffer, if we knew enough to avoid that which is often the cause of our falling sick. In these lessons we want to help you to begin this study, and to so interest you that you will choose to go on with it in a better way as you grow older.

"What is food?" and "What is poison"? are the two questions we must first learn to answer.

You can readily see how important it is that we should be able to answer them correctly, for it would be a dangerous mistake, if, because we knew no better, we should take as *food* something that should prove to be *poison*.

We must seek an answer to these questions from men of science who have given their lives to the study of such matters.

These men tell us that our bodies go through a continual change,—that a constant waste of all parts of the body is caused by the work we do, the exercise we take, and the

use of all our organs,—such as the heart beating, the lungs breathing, the eye seeing, or the brain thinking,—and that this waste is repaired by the air we breathe, the water we drink and the food we eat. They teach us also that our bodies must have a certain amount of heat, and that this heat is supplied by certain kinds of food, and is used up by every exertion we make.

We can put their answers to these questions in a few words, which will include all that they teach us, and which we shall do well to remember.

*Question No. 1.—What is food?*

*Answer.—A food is anything that will supply materials to repair the waste of the body, whether the waste be of *heat* or of the *actual substance*, such as bone, brain and muscle.*

*Question No. 2.—What is a poison?*

*Answer.—A poison is anything which will cause death or injure health when taken into the body.*

Will you try and remember these two texts

word for word, so that you can repeat them when we come to our next lesson?

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### QUESTIONS ON LESSON No. III.

1. What are artificial foods? Mention some of them.
2. How do we learn whether such foods are good for us or not?
3. What do you understand by an inherited taste for harmful things?
4. Does a pure natural taste ever like poison?
5. What is the meaning of a food?
6. What is a poison?

## LESSON NO. IV.

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NATURAL DRINK.

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WE come now to a subject of even greater importance than any we have yet studied,—the question: “What shall we drink?”—a question of much greater importance, because, though men have been known to exist many days without food, no one can live long without drink. To suffer thirst is one of the most horrible forms of suffering known, and to die of thirst is a death too fearful to be described. Yet, important as it is, it is really a very simple question to answer. Bountifully as the Creator has supplied our wants in the great variety of food He has given us, He has seen fit to provide but *one fluid* alike for man and animals to drink. This one fluid is *Water*; there is positively *nothing else* in the world for us to drink, and we *need* nothing else.

I wish you to heed very carefully this statement, because I expect that many children, and some older people will want to deny it, and I mean to *prove* to you that it is true, as carefully as I can. Let us name everything that we have ever known any one to drink ; what have we ? First, *Milk*—yes, but what is milk ? We learned in our second lesson that it is a *food* ; everything in it which goes to *make* it milk is *solid* food, and this solid portion is about one-eighth part of its substance. What then, are the other seven-eighths made of, which gives it the form of a drink ? It is simply *water*. Next we have coffee and tea. Yes ; but coffee by itself is only a dried berry, and tea is the dried leaves of a tree, and to make them into a drink, we steep or boil them—in what ? In simple water. Then we have wine, beer, and spirits,—yes, some people do drink these things. But what are they made of ? I shall tell you more about them in another lesson ; but this is true of each and all of them : they have more or less of a fluid

called alcohol in them, a fluid which by itself we could not possibly drink, and beside this, that which alone makes them drinkable—simple water. When you hear men boast that they would not drink anything “so weak as water,” you may judge how foolish they are, if you remember that the strongest liquor they can get is little less than one-half of it water. Did you ever see any creature but man drink anything but water or milk? No, indeed; other animals know better how to follow their natural instincts. The wild beast and the savage to whom the white man has not taught the use of his poisonous “fire-water,” teach us a lesson which children, as well as men and women in a Christian land, should be ashamed to have to learn from them.

What a wonderful amount of work is done by men and by animals, and what strength and beauty they have who live on simple food and pure, fresh water. How long the birds can fly, how far our horses or oxen or camels can travel, and what heavy burdens

they can draw or lift, with nothing else than water to sustain their strength. Again and again it has been proved that men and women can bear more fatigue, can march longer distances, can do better work and enjoy better health when they drink only pure water, than when they take coffee, or tea, or, worse than all, alcohol in any of the many beverages which we call wine and beer and whisky, etc.

The Bible tells us about some men called "Nazarenes," who were the strongest men known, because they were temperate in all things, and especially because they drank nothing but pure water. In our next lesson we will talk about the uses of water in our own bodies.

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#### QUESTIONS ON LESSON No. IV.

1. Why is it very important to know what we should drink?
2. What is the *only* drink which God has given us?
3. Do we need anything else to drink in

order that we may keep ourselves strong and well?

4. What other fluids do men drink?
5. Do other animals drink such things?
6. What is mixed with them that alone makes them drinkable?
7. Can we do more or less work, and shall we be stronger or weaker if we drink nothing but water?

## LESSON NO. V.

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THE USES OF WATER IN THE BODY.

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To discover *why* the Creator has given us nothing but water to drink, we shall not have far to look; we have only to turn our eyes upon our own bodies and study their form and workings.

In the first place, how much *water* do you think these bodies of ours contain? Well, suppose we were to take the dead body of a man which weighed 144 pounds, and after keeping it for a time in a great heat, so as to dry it up completely, suppose we weighed all the solid matter there was left, we should find that we had now only about eighteen pounds left out of the one hundred and forty-four. What has become of the remaining hundred and twenty-six pounds? It was simply *water*, which has evaporated or passed away as steam.

Therefore, seven-eighths of the whole weight of the human body are *water*. It forms by far the greater part of the muscles, the brain, and the blood. It makes all the solid parts of the body flexible, gives them their size and shape, and forms them into the soft jelly-like substance of which they mostly consist. Even so hard a substance as *bone* contains one-tenth part of water. In the blood we find *seventy-nine parts* of *water* to twenty-one of solid matter; if any of this water be taken away from it the blood becomes thickened and cannot circulate freely through the blood vessels. The fluids of the body which dissolve the food as it passes through the mouth, the stomach and the intestines, contain a large quantity of water, and if this should be removed they could not help as they do to digest the food. The water in the blood and in these other fluids keeps the solid matter which they contain, dissolved or suspended in it. It enables the blood to be pumped out by the heart and sent all over the body, carrying with it nourishment, taken

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from the food we eat, to all the different parts of the body ; to the brain, the muscles, the nerves, the liver and every other organ, giving to each one just what it needs. As the blood returns it takes away with it all the material which has been worn out by work and has become bad, and which, if not thrown out of the body, would cause us to fall sick and die.

Then the fine, delicate membranes which cover the various organs of the body, such as the brain, contain a great deal of water, and allow water to pass through them very easily. Now what do you think would happen if we took anything into the body which would absorb or drink up this water throughout the system ?

In the first place, these delicate little membranes, of which I have just told you, would lose the water they contain and would become so dry, and hard, and thick, that no water could pass through them ; they would grow smaller and press upon the organs which they enclose, and injure them. In the same

way the blood would have to give up some of the water in it ; it would become thicker than it should be, and could not run so freely through the vessels. All those parts of the body which could be reached by the substance which absorbed the water, would lose some of it, and so they would shrink and soon be unable to do their proper work. You see the whole body would soon be out of order, and might die for want of water.

And you understand now what a very important thing is the water in our bodies, and you will see some of the reasons why we have to drink so much of it, and why nothing else can take its place. How careful we should be, then, that we do not take anything into our bodies which will interfere with this water-supply in any way. I shall begin to tell you in our next lesson something about a substance which acts in just this way, and yet is drank every day by a great many people.

This is the fluid called *alcohol*.

## QUESTIONS ON LESSON No. V.

1. What is it that makes up the largest part of our bodies?
2. How large a part does it form?
3. How much of it does the blood contain?
4. Is it found all through the body?
5. What would happen to the blood and to the soft parts of the body if the water was taken out of them?
6. What is the substance which we are now about to study which thus absorbs water?

## LESSON NO. VI.

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ARTIFICIAL DRINKS.

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DOES it not seem very strange that as long as men and women had so pure, so refreshing, so needful a drink as clear cold water with which to quench their thirst, they should ever have thought of drinking anything else? And yet, many hundred years ago, they learned to make and to drink many other things, all of them more or less harmful, which were never provided for them by Nature, and we think never intended for their use. All these things we call "artificial drinks," but we have common names for each one of them, such as ale, beer, wine, whisky, brandy and gin. We are accustomed to talk of these drinks as if they were very different from each other, and it is true that they appear to be so. But really the difference is only in form, and color, and degrees of

strength ; they all contain *one thing* for which men drink them, and that *one thing* is *alcohol*. What alcohol is I will tell you soon, and in some future lessons we shall see how it acts upon the human body.

Whether or not it is right and proper for us to use these “alcoholic drinks,” as they are called, and if so, to what extent we may use them, in what way and at what times—are the main questions which form the study of temperance. The only way we can answer these questions truly is by gaining a clear knowledge of *the nature of alcohol* and of its action upon the body : this we shall try to do.

All of these artificial drinks contain a large quantity of *water*, but by mixing the alcohol with them in various quantities, they gain a new and a peculiar taste. The quantity of alcohol found in such drinks as beer, ale, wines, etc., varies very greatly. In all of them the alcohol is the dangerous part. There is four or five times as much alcohol in brandy or whisky as in beer ; and two or

three times more than in wine : hence spirits are by far the most dangerous.

It is difficult to understand how people learn to like these drinks, because the first taste of most of them is unpleasant. I have never known a person who liked the first taste of any one of them, and to children they always seem like medicine when they take them for the first time. A liking for them has to be learned like any other habit. We do not naturally desire them as we do water, because they do not satisfy our natural wants as water does. You have never heard of anyone who had a natural *dislike* for water. It is fair to say then, that unless we can find some other good reason for using them, we do not *need* them, and, therefore, should not take them.

Dr. Richardson says : "A little child can live and grow up, can learn and work and play, and be very healthy and pretty, strong and happy, without these drinks," and men and women can do without them just as well. Long ago wise men found out that drink of

this sort was very harmful, and Solomon, the wisest man who ever lived, said of it that "it biteth like a serpent, and stingeth like an adder."

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#### QUESTIONS ON LESSON No. VI.

1. What are "artificial drinks?" Name some of them.
2. What two things do they all contain?
3. Do they all contain these two things in the same quantity?
4. Which contains the most alcohol—brandy, wine or beer?
5. Do people ever like the first taste of these drinks?
6. Can a person be strong and happy without taking them?

## LESSON NO. VII.

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THE NATURE OF ALCOHOL.

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[Let the teacher provide two glasses, one filled with pure alcohol, the other with water; also, a few matches.]

The first question you would naturally ask about alcohol, is: What does it look like? Pure alcohol does not look like wine, or beer, or whisky. These are all colored with different substances, but pure alcohol has no color; it *looks* just like *water*. Here are two glasses, one of them contains *alcohol*, the other *water*, but you can not tell which is which by looking at them alone. Have we no way of telling the difference between them then without we taste them? Oh yes, many ways. Suppose you smell the contents of the two glasses, you can at once discover how different they are. The *alcohol* has a strong odor, but the *water* has none. Again,

let us dip a slip of paper into the water and put a lighted match to it; you see it will not burn until the heat has dried up the water, when the *paper* will catch fire. Now, let us do the same with the alcohol, and you see that it immediately takes fire *itself*, and burns quite independently of the paper. We say then that alcohol is an *inflammable fluid*, that is, a fluid that will burn.

If you were to touch a drop of this fluid to the tip of your tongue, you would find that it has a hot, stinging taste, very unlike the cool, refreshing taste of water. Let us remember these facts, because they will always help us to tell alcohol when we see it.

1. It has a strong, peculiar odor.
2. It will burn very readily.
3. It has a hot, stinging taste.

It is also very much lighter than water, and will boil much sooner than water will.

Were you to drink only a small quantity of pure alcohol, unmixed with water, it would give you great pain, and would probably cause your death.

The next thing you will want to know is,  
How is alcohol obtained?

Well, it is made from several things, such as grapes and other fruits, barley, corn and rye. The reason why it can be made from all these different things is, that they all contain the one material from which alcohol is formed. This one substance is *sugar*.

But would the sugar which is found in these turn into alcohol of itself, without anything to aid it? *No, it would not.* In order that it may form alcohol, it requires to be properly moistened and exposed for a long time to a great heat.

As far as we know, these conditions necessary to form alcohol are supplied *not by nature, but by man.*

The juice of fruits is pressed out, or the grain is broken up, water, and sometimes more sugar, is added to it, and it is then allowed to stand in a very warm place. After a time we begin to see a change take place in the mixture; it becomes frothy; we say that it is fermenting, or that a chemical change is

going on by means of which something *new* is formed, which is entirely different from the things we had at first. A gas rises from it and escapes ; this is called carbonic acid gas, and a fluid remains behind which we call *alcohol*. This fluid is then distilled, that is, it is boiled just as we boil water in a kettle, and as the steam comes away it is collected in a cold vessel and again becomes fluid. This fluid is now *pure alcohol*, and the process by which it is made is called fermentation and distillation.

The various alcoholic drinks—ale, beer, cider, wines, whisky, brandy, etc.—are so called because they have a certain quantity of alcohol in them. Some of them, as whisky and brandy, have a great deal ; others, as beer and cider and wines, have much less.

You know that when men take a quantity of these drinks, they become drunk or intoxicated, and it is always the *alcohol* in them which *makes* them so.

We call these drinks by different names because they have each a different taste, are

differently colored, and are made from different kinds of fruit and grain : but they all have enough alcohol in them to do very much harm.

I think we understand now what alcohol is, and how it is made. Let us remember that it is a substance formed by the work of man, and though doubtless intended for some wise purpose, was certainly not provided for us to drink in any shape whatever.

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#### QUESTIONS ON LESSON No. VII.

1. How can you tell the difference between alcohol and water ?
2. What is the color, odor and taste of alcohol ?
3. Could one drink pure alcohol, unmixed with water ?
4. From what substance is alcohol made ?
5. What are fermentation and distillation ?
6. Does it require the work of man to make alcoholic drinks, or has nature provided them for us ?
7. What is the one thing contained in all strong drinks, which causes intoxication ?

## LESSON NO. VIII.

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### THE ACTION OF ALCOHOL ON THE BODY.

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HAVING learned what alcohol is, and how it is made, we will now inquire how it acts upon our bodies when we drink it. In studying the effects of alcohol in this way, remember that we are studying the effects, in greater or less degree, of all those drinks of which alcohol forms a part, because it is the alcohol in them which makes their action upon man very much the same in all cases. I shall not now tell you what are the *final* results of the habit of drinking alcohol constantly,—results which come about after a long continued use of it; these we will study at some other time, but now we will ask about its immediate consequences. We learn first that its action is divided into four distinct stages, or parts. Let us see what these stages are.

Suppose that one of you had drunk a mod-

erate quantity of alcohol,—which is something I hope you will never do,—you would feel, in the *first stage* of its action, rather excited ; an agreeable flush or glow would come to your face ; your heart would beat more rapidly than usual ; your thoughts would come quickly, but they would be a little confused ; you would say that you *felt warmer* than common, and the *surface* of your body *would* be a little warmer than it formerly was. You would be very apt to think that your whole body was warmed by the alcohol you had taken, but that would not be *true*. The *feeling* of heat would be the same as you have felt when you put your hand into very cold water, but really the cold water and the alcohol have done just the same thing ; they have drawn the heat *out* of your body instead of putting it in, and it is only the *surface* that is any warmer. From this condition you would pass into the *second stage*.

The flush on your face would die out, you would feel tired and languid, your body would grow chilly, its temperature would be

*lower* than it should be, and your mind would be confused and weak. If you were to go out into the cold air at this time, you would be very apt to *take cold*. It would be two or three hours before you could recover from these effects, but provided you had not taken very much alcohol, they would probably pass away without giving you any further trouble.

Now suppose a man to have taken a *larger* quantity; a *third stage* of its action would then follow the second, and people would then say he is "*drunk*." You will then see that he can not walk straight nor speak plainly, he loses control of his limbs as well as his thoughts and speech; he acts and speaks very foolishly, and says many silly or angry things; all the organs of his body are overfilled with blood and can not do their work properly; he becomes *cold* and it may be a long time before he can recover warmth and strength again. I expect that most of you have seen the sad spectacle of a drunken man staggering along the streets, and you know now just what condition he is in.

But still another, a *fourth* stage, occurs, which has much the *appearance* of *death*, and has been known to pass into *actual death*; indeed we say of a man that he is "*dead drunk*." He can not hear, can not talk, can not see nor feel; he lies in a deep stupor; he is very, very cold; his heart beats very feebly, and his breathing is heavy and difficult. He barely lives, and though he slowly comes out of this condition, it will require several days to restore him to his ordinary health, and probably he never can undo the injury he has thus inflicted upon himself. I do not need to tell you that every one of these stages caused by alcohol drinking, from the first to the last, is *unnatural*, and therefore harmful.

Why, then, does anyone ever take this injurious thing? It is difficult to say why they ever *begin* to drink it, unless it is that they are afraid not to do as others around them do, and are ignorant of its terrible results. But having once begun, the habit once *formed*, it becomes after a time so strong

a craving that they are unable to resist it, and in many cases they are obliged to take constantly more and more, in order to satisfy this craving.

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#### QUESTIONS ON LESSON No. VIII.

1. What do you mean by the action of alcohol on the body?
2. How many *stages* of its action are there?
3. Describe as fully as you can its *first stage*.
4. Describe the *second stage*, and the *third*, and the *fourth*.
5. What do we say of a man when he is in the third and four stages?

## LESSON NO. IX.

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### 'THE ACTION OF ALCOHOL ON THE BODY. CONTINUED.'

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HAVING studied the effects of alcohol upon the body in its four stages, we will now try to find out how some of those effects are brought about. When the alcohol is first taken into the stomach, it passes through the walls of the stomach, and is absorbed into the blood and carried by the veins to the heart. From there it is pumped out by the heart with the blood, and is sent to the lungs, where the blood comes into contact with the air we breathe and is purified and renewed by it; that is, the blood comes to the lungs and there loses the waste material,—called carbonic acid gas, which it contains, and receives in return from the air a new supply of a gas called oxygen, which is used up in the body and helps to give it heat. We can very easily detect the presence of alcohol in the blood

when it comes to the lungs, because a part of it is breathed out from them, and we can smell the odor of alcohol at once in a person's breath. Whatever alcohol is still left in the blood is now carried back to the heart, and from there sent with the blood all over the body.

Let us see what this alcohol is doing while it travels through the body in this way.

In the first place, if it is not sufficiently mixed with water, it makes a long stay in the stomach, because it cannot be absorbed without being mixed with about three times its bulk of water. When this happens, it very seriously interferes with the digestion of food in the stomach, and injures the lining coat or membrane of the stomach, often causing inflammation and sores to appear upon its surface.

When it has been sufficiently mixed with water, it passes through the stomach into the blood, and its first action is to make the heart beat much faster, and so to send more blood into the small vessels throughout the body.

Instead of beating about 73 times every minute, as it should, the heart will make from 80 to 90 beats a minute. It is this larger quantity of blood sent to the surface of the body which causes the flushing of the face, the excitement and the feeling of warmth which we spoke of as occurring in the first stage of the effects of alcohol.

After a time this all passes away, and the heart beats rapidly but more feebly. It is beginning to be *tired* by the extra work it has been forced to do. I told you in one of our lessons that the blood contains a great quantity of water, and that in this fluid a great number of small bodies are found which are called corpuscles. These corpuscles contain a great deal of water in themselves, and it is their business to take up the oxygen from the air when the blood comes to the lungs, and to carry it to all parts of the body. Now alcohol, as I have told you, has a great liking for water, and absorbs or drinks it up whenever it can ; so now it draws the water out of these blood corpuscles and causes them to

shriveled up and grow small, so that they cannot take up the oxygen which the body needs. What is the consequence of all this? It is by means of oxygen that *heat* is formed in the body, and so when the supply of oxygen is cut off through the injury of the blood corpuscles, the body begins to grow colder, and we find the heat reduced as we see it in the later stages of the effects of alcohol.

The brain and the nerves also become dulled and stupefied, and lose control over the thoughts, the speech, and the motions of the limbs.

All the organs of the body are overfilled with blood, and cannot do their proper work in consequence. When the alcohol is taken in very large quantities, it has a still more serious effect upon the blood, destroying the corpuscles, and causing it to form in clots or thick masses which prevent the blood from passing along in its proper course. In this way many terrible diseases of the brain, liver, kidneys and other organs are brought on. Cases have been known in which men have

died almost instantly after drinking a large quantity of spirits, and it has been found afterwards that death was caused by the rapid clotting of blood in the heart, making it stand still at once.

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#### QUESTIONS ON LESSON No. IX.

1. What first happens when alcohol is taken into the stomach?
2. What occurs when it reaches the lungs?
3. What effect does it have upon the heart?
4. What does it do to the blood?
5. How does it deprive the body of heat?
6. In what way has instant death sometimes been caused from drinking large quantities of alcohol?

## LESSON NO. X.

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### ALCOHOL AS A FOOD.

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ALTHOUGH we know so well the harm which alcohol does when taken into our bodies, there are still people who say that alcohol is a kind of *food*; that in small quantities it helps, in the same way that bread or milk does, to support life in man.

You remember that alcohol, until it is diluted with two or three times as much water, cannot be absorbed into the body, and that when so taken, without being diluted, it only hardens and destroys every living part which it touches, by seizing the water which that part contains, and leaving it dry and dense. It is very difficult to understand how any one can put such a destructive thing side by side with such life-giving things as bread or milk. Is it likely that Nature would have given us so dangerous a substance as this for

a nseful food? We have now come to the place where we shall find something we have before studied, of use to us in deciding whether alcohol *is* or *is not* a *food*.

Do you remember that in one of our lessons we learned the true meaning of a food? Can you repeat the text you then learned? It was this:

A food is anything that will supply materials to repair the waste of the body, whether the waste be of *heat*, or of the *actual substance*, such as bone, brain or muscle.

Now, alcohol will not in any way answer to this description of a food. It does not supply *water* to the body; instead of that it takes water *away* from the body. It does not give to the body any of the materials necessary to repair the waste of any part of it, nor does it give to it any degree of heat. We shall more clearly see that this last point is true when we come to learn how little power alcohol has in aiding men to withstand the effects of extreme cold.

Alcohol can not be said to be a food in any

true sense. No food that we know will work the mischief that alcohol does, no matter how much of it we take. Milk is the best food we have of a fluid kind, but who ever heard of too much milk making a man unconscious, or causing him to lose control over his limbs. We ought to be temperate in every thing we do, and we must not take too much of any thing; we may do ourselves harm in many ways, but there is a great difference between indulgence in *good* things and indulgence in *bad* things. We are trying to find out the proper use of alcohol, and we shall probably learn that it has its right place, but it surely is not that of a *food*.

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#### QUESTIONS ON LESSON NO. X.

1. Can pure alcohol be absorbed into the body?
2. What action does it have upon the parts of the body with which it comes in contact?
3. What is the true meaning of a food?
4. Is alcohol useful in any such way?
5. Does it supply water, or nourishment, or heat to the body?

## LESSON NO. XI.

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ALCOHOL AND TEMPERATURE.

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WE have learned that the first feeling of warmth which results from drinking alcohol diluted with water, and in small quantities, is *not* a sign of *increased* heat, but is rather a sign of *loss* of heat from the surface of the body. This is quite true. How is it then that alcohol is said by some people to keep the body warm? Men will tell you sometimes that they take alcoholic drinks in summer to keep them *cool*, and in winter to keep them *warm*. It is not at all likely that both statements can be true, but let us try and learn whether *either* is so.

Many experiments have been made to test these questions, and it is easy therefore to find out the truth. In very hot countries, as in Africa or India, where soldiers have to march long distances exposed to the heat of a

tropic sun, it has been found again and again that those who take alcoholic drinks suffer *more* from the heat, and are more liable to the diseases which are so prevalent in hot climates, than those who abstain from the use of everything of the kind, and live only upon water and simple food. This has been proved so often, and the contrast in the health or sickness of these men shown so plainly, that it would be very foolish for us not to accept these facts in the case, or to believe that alcohol can help men in any way to bear any exposure to heat.

Now let us look into the question of its aid in withstanding the effects of *extreme cold*. We shall find plenty of facts on this point also.

Dr. Richardson tells us that he has taken two animals of the same kind and size, and giving a quantity of alcohol to *one* of them, he has put them both into a very cold place until they have fallen asleep. He has found in every case that the animal which had taken the alcohol *died* while asleep, from the com-

bined effects of the alcohol and the cold, whilst the other awoke in apparently good health, and showed no marked ill-effects from its exposure.

You have probably heard, at some time or other, of ships sailing up into the Arctic regions, where the cold is more intense than we have any idea of, and where they are surrounded with snow and ice all the year round. Well, the men who go in these ships have learned that those who drink alcohol, or "grog," as the sailors call it, are the men who suffer most from the cold, and that they can best endure its severity who leave "the grog" alone.

This fact has been so clearly shown, that a large company, called the Hudson Bay Company, which employs a large number of men to work in that very cold climate, has ordered these men not to use anything at all in the shape of alcohol. We may read of a great many instances of travelers who have marched for many miles through the snow, and at last have become tired out and have sunk down

in the snow and died. Over and over again it has been found that most of those whose lives have been so lost, have used some kind of alcoholic drink while on the journey, in the vain hope that it would keep out the cold.

We may safely learn from these things that alcohol has no power whatever to aid us in bearing either extreme of heat or of cold.

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#### QUESTIONS ON LESSON No. XI.

1. What is the first feeling of warmth after drinking alcohol a sign of?
2. Can alcohol help us to bear extreme heat?
3. Give some instance which will prove that it cannot?
4. Can it help us to withstand the effects of cold?
5. What proof can you give of this?

## LESSON NO. XII.

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ALCOHOL AS A POISON.

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AFTER studying the effects of alcohol and learning that it is *not* a food, the question naturally occurs to us, *Is alcohol a poison?* We must again recall what we have learned in previous lessons, and ask what a poison is. Can any one tell us the meaning we gave of a poison? *Answer*—“A poison is anything which, when taken into the body, destroys life or injures health.” Now we have to decide whether alcohol *does either one or both* of these things. We have seen that its immediate effects upon the mind and body are unnatural, and therefore harmful. If we could say no more than this, we should be justified, for this reason alone, in calling alcohol a poison, because in these effects it would involve an injury to health. But alcohol *does* much more than this. When it has been taken in very large quantities, it has

been known to cause *instant death*, and the number of deaths which it causes indirectly we have no means of telling, but we know they are very many. Besides this, we have not yet considered the final results of a long-continued use of alcoholic drinks. You are all familiar with the red faces of old drinkers, and this redness of face is only an outward sign of the disturbances which are going on within. It is caused by the constant stretching of the small blood-vessels of the skin, which occurs because of the extra quantity of blood forced into them by the heart beating faster under the action of alcohol. This stretching of these tiny blood-vessels weakens their walls, and makes them very thin, so that any great pressure of blood may at any time oblige them to give way, and the blood thus escapes. This happens not only to these small vessels of the skin, but also to all those found in the interior of the body, in all the various organs, such as the brain, the liver and the kidneys. In this weak state the vessels are unable to circulate the blood as fast as

they should, and often they become altogether clogged in some part, and the blood is hindered from following its proper course. The blood, on account of this weakening of the vessels, may escape into the brain or other organs, and the result is death from hemorrhage or apoplexy, as it is called.

Besides all this, many chronic or long-standing diseases are directly brought on by indulgence in alcohol. The liver often becomes shrunk and hardened, and presents the appearance known as "hob-nailed liver," and in this condition it is of course unable to do its proper work.

The lungs sometimes suffer, and a peculiar form of consumption, which, as far as we know at present, is incurable, is brought on; it has received the name of "alcoholic consumption."

Digestion is continually interfered with, and a man so affected is apt to become what we - a dyspeptic. The brain is frequently injured, changing in form and substance, its covering growing hard and thick, and the mind, in con-

sequence, becoming dull and confused. A large part of those poor people who are insane, that is, out of their minds, and have to be put into insane asylums, owe their misfortune to the use of alcohol.

We can put no limit to the disease and misery caused by its dreadful power over the body and the mind of man, and we need not fear that we are making any mistake if we class alcohol at once in the list of the deadliest poisons.

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#### QUESTIONS ON LESSON NO. XII.

1. What do you understand by a poison?
2. Are the immediate effects of alcohol such as to justify us in calling it a poison?
3. How does it act upon the small blood-vessels all over the body, after its long continued use?
4. What dangers are likely to result from these effects?
5. What is its effect upon the liver?
6. What is its effect upon the brain?
7. What disease of the mind is often caused by the use of alcohol?

## LESSON NO. XIII.

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ALCOHOL AS A MEDICINE.

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We began our study of alcohol with the intention of finding out what was its proper use, because we cannot doubt that *everything* which has come into the world has some *right purpose*, although we know that men put many things to *wrong purposes*. The use of alcohol as an article of drink, in any way, shape, or manner, is without doubt its *wrong purpose*. Its proper use may be very small, for we must remember that it is something made or obtained by man from some of Nature's best gifts, and that it is *not* made by God in a single one of the many forms in which man uses it.

I could tell you of its uses—as an article fit for burning in lamps when heat without much light is needed ; as a fluid in which to dissolve certain substances which will not dissolve in

water, and in various other ways. But what we most want to know is, whether it has any good use in our own bodies.

We have decided that *it is not a food*, so we must not use it in that way. We have seen that it takes away water from the body, instead of giving it to it, and therefore, as water is the only drink which our bodies need, we must not use it so.

We have learned that *it is a poison*, and you will rightly ask, should we *ever* take poison? No, we should *not*, if we can possibly help it; and yet we must remember that all *medicines* are, to some extent, *poisons*, and in sickness they are often very useful to us. We *ought not* to need them, because we *ought not* to be sick, and in most cases it is our own fault if we are. If we took proper care of ourselves and were temperate; as we should be, in everything, we should very seldom need any medicine. It is safe to say that the less we take the better for us. The greater number of the best physicians of the

present day tell us that the only proper place for alcohol is that of *a very powerful medicine*.

It is true that doctors have used it in this way in times past much more than it should be used, and that in many cases the habit of drinking has been formed, and men made drunkards through its too great use as a medicine. Its abuse is no argument, however, against its proper use, because the same thing might be said of opium and many other medicines. Knowing how strong a poison it is, we should *never* touch it unless we have directions to do so from the best physicians we can get, whom we are sure would not give it to us unless it was necessary for us to take it, or unless we have what we call "*a case of life or death*," that is, a very serious case of sickness, in which we have no doctor at hand and have no better medicine than alcohol to take. In using it as a medicine we should *always* take it *as alcohol* in its simple form, and never in any of the drinks in which it does so much mischief.

If you ask your doctor to give it to you only

in this way, he will always be glad to do so. Taking it so we avoid the greatest temptation to any longer use of it than we actually need.

You must remember that it is just as strong a poison, and as dangerous a medicine to take as opium, or chloroform, or strychnine, and should be used with the same care that we show in the use of these.

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#### QUESTIONS ON LESSON No. XIII.

1. Has alcohol any rightful use?
2. What are some of the common uses to which it is put?
3. What is its only proper use in the human body?
4. Is it a dangerous medicine?
5. In what form should it always be taken?

## LESSON NO. XIV.

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**ALCOHOL, DISEASE AND DEATH.**

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WE have now studied both the transient and the lasting effects of alcohol on those who drink it, and it is indeed a lesson we cannot know too well. We have seen how it injures the blood, and through that injury lessens the heat of the body. We have learned how it weakens the blood vessels, and so paralyzes them that they cannot control the supply of blood in any part, causing oftentimes fatal bleeding in the lungs and other organs, as apoplexy in the brain.

We have studied its bad effects upon the liver, the kidneys, and the heart. We have learned how often it is the fatal cause of insanity of every sort.

But yet we have not seen one-half of the dreadful mischief it works upon the bodies and the minds of man.

- Those who are in the constant habit of drinking alcohol in any of its various forms, even in very moderate quantities, cannot judge of the harm that it is doing them as long as they continue to take it. When they leave it off but for a day, the instant feeling of intense depression and weakness they experience, leads them to renew or increase their usual dose of the poison, in order thereby to remove this sense of their need of it.

They do not realize that this very weakness and depression is nature's signal of distress, her sign of the terrible wrong they are inflicting upon themselves. They do not know that it keeps up a constant necessity for its use in order to do away with a sense of the evil that it works. They *think* that it gives them *strength*, but really it is a *weakness* which makes them more and more dependent upon that which supplies a false support to their failing strength.

They claim that it adds new warmth to their chilled and benumbed bodies, but really it only robs them of the fuel which can alone keep alive the heat within them.

They say that it yields them the nourishment of a useful food, but they see not that it hinders and destroys the simple process by which they digest true food. They fancy that it gives them the power to do harder work and to endure greater fatigue; but instead, it lessens that endurance and eventually spoils their ability for any sort of hard labor.

Slowly but surely it sows within them the seeds of many painful and often fatal diseases, which sooner or later will endanger and cut short their lives.

Year by year we read the story of those who die of a multitude of various ills—diseases of the brain and the nerves, diseases of the lungs, of the heart, of the blood, the liver, the kidneys, an almost endless list of complaints, but we are not told, we do not know, how many of these diseases owe their beginnings or their fatal endings to the use of alcoholic drinks. The truth is, that so large a number are either induced or made more dangerous from this source, that it has become impossible to trace the fact. It is a fearful

proof of the evil influence of alcohol over the body, to know it to be true that in great and wide-spread diseases, such as cholera, those who are most sure to be attacked, and most likely to die, *are those who drink*. I remember once seeing what is called a dissolving picture—that is, one picture fading into another—which very truly and dreadfully illustrated this fatal subject. The first picture thrown upon the canvas was that of a man in all the bloom of health and pleasure, drinking from a bowl of wine, and as it dissolved into the next, we gazed upon its result—a human skeleton grasping an empty cup.

It told a true story. Must it not be a sin to indulge in anything which works such untold mischief upon the bodies and the minds of men, and which, after all, has not a single good effect to recommend its use? And if it be a sin, as I doubt not it is, it is no wonder that trouble and disease follow in its steps, for it is an old Bible truth that “the wages of sin is death.”

QUESTIONS ON LESSON NO. XIV.

1. Can you mention any good effects from the use of alcohol?
2. What are some of its evil results?
3. Does it render people more liable to disease?
4. In what class of persons are diseases most fatal?
5. Do you think it a sin to drink alcohol in any form?
6. What is the natural result of sin?







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